



Complete Summary

GUIDELINE TITLE

Chronic chest pain—suspected cardiac origin.

BIBLIOGRAPHIC SOURCE(S)

Gerson DS, Rybicki FJ, Yucel EK, Khan A, Haramati LB, Ho VB, Rozenshtein A, Schoepf UJ, Stanford W, Woodard PK, Jaff M, Expert Panel on Cardiac Imaging. Chronic chest pain-suspected cardiac origin. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 6 p. [39 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Higgins CB, Bettmann MA, Boxt LM, Gomes AS, Grollman J, Henkin RE, Kelley MJ, Needleman L, Pagan-Marin H, Polak JF, Stanford W. Chronic chest pain--suspected cardiac origin. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):29-34.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

COMPLETE SUMMARY CONTENT

SCOPE
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SCOPE

DISEASE/CONDITION(S)

Chronic chest pain of suspected cardiac origin

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Family Practice
Geriatrics
Internal Medicine
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with chronic chest pain of suspected cardiac origin

TARGET POPULATION

Patients with chronic chest pain of suspected cardiac origin

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray, chest, posterior/anterior (PA) and lateral
2. Nuclear medicine, myocardial perfusion scan, stress
3. Ultrasound
 - Echocardiography, transthoracic, stress (TTE)
 - Echocardiography, transthoracic, resting
 - Gall bladder
4. Computed tomography angiography (CTA), heart
5. Invasive (INV), angiography, coronary
6. Magnetic resonance imaging (MRI)
 - Heart, resting (function and delayed enhancement)
 - Heart, stress (wall motion and perfusion)
7. Positron emission tomography (PET), heart, stress
8. Computed tomography (CT)
 - Heart, calcium scoring
 - Chest, with contrast
9. Magnetic resonance angiography (MRA), coronary arteries

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are

distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Chronic Chest Pain -- Suspected Cardiac Origin

Radiologic Procedure	Appropriateness Rating	Comments
X-ray, chest (PA and lateral)	9	Helpful to exclude a noncardiac cause of chest pain.
NM, myocardial	9	Effective for evaluating myocardial

Radiologic Procedure	Appropriateness Rating	Comments
perfusion scan, stress		perfusion.
US, echocardiography, transthoracic, stress (TTE)	7	If coronary arteries are normal, and concern involves structural heart disease.
US, echocardiography, transthoracic, resting (TTE)	7	Can be used to demonstrate LV regional dysfunction due to ischemia and excellent for regional wall motion abnormalities.
CTA, heart	7	Can be used to noninvasively visualize the coronary arteries. Excellent to assess coronary disease with multidetector scanners. May be useful in low-risk population but has not been studied in this population.
INV, angiography, coronary	7	The definitive test for establishing the diagnosis and directing treatment if clinical suspicion of CAD is high, or if there is an abnormal noninvasive imaging test.
MRI, heart, resting (function and delayed enhancement)	6	Can be used to noninvasively evaluate LV regional dysfunction and areas of prior MI.
PET, heart, stress	6	Especially for patients who may not be optimal for conventional nuclear imaging (i.e., obese patients).
CT, heart, calcium scoring	5	Negative test highly accurate in excluding CAD. Indicated in appropriate population where a pretest probability of zero calcium score is high.
MRI, heart, stress (wall motion and perfusion)	5	Stress studies should only be performed at sites with appropriate expertise and equipment, due to safety concerns.
CT, chest, with contrast	4	Could be used to establish a noncardiac cause for chest pain. Possible utility in aortic dissection and potential pulmonary abnormalities.
US, gall bladder	3	Only if complete cardiac workup is negative. Can be used to exclude a noncardiac cause for chest pain.
MRA, coronary arteries	2	May be indicated in patient unable to

Radiologic Procedure	Appropriateness Rating	Comments
		receive iodinated contrast, at sites with extensive expertise.
<p align="center"><i>Appropriateness Criteria Scale</i> 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate</p>		

Abbreviations

- CAD, coronary artery disease
- CT, computed tomography
- CTA, computed tomography angiography
- INV, invasive
- LV, left ventricular
- MI, myocardial infarction
- MRA, magnetic resonance angiography
- MRI, magnetic resonance imaging
- NM, nuclear medicine
- PA, posterior-anterior
- PET, positron emission tomography
- US, ultrasound

Summary of Literature Review

Chronic chest pain of suspected cardiac origin is usually a consequence of myocardial ischemia. This is usually caused by fixed stenosis (atherosclerotic plaques), coronary spasm, microvascular disease, or a combination of the three. Chest pain of cardiac ischemic origin represents an imbalance between myocardial oxygen demand and coronary blood flow, and chronic pain can occur in patients with normal coronary arterial caliber for whom the primary cardiac pathology is extracoronary, (e.g., aortic stenosis, hypertrophic cardiomyopathy). Nonischemic cardiac pain may be caused by pericarditis. While the syndrome of exertional angina pectoris is nearly always diagnostic for chronic coronary arterial disease, other extracardiac etiologies should be considered, especially for nonexertional or atypical chest pain, such as esophageal reflux and spasm, biliary disease, costosternal syndrome, and cervical radiculitis.

In patients with chronic chest pain, imaging has a major role in determining and documenting the presence, extent, and severity of myocardial ischemia and/or the presence, site, and severity of obstructive coronary lesions. Imaging findings are an important factor in determining the course of management of patients with suspected chronic myocardial ischemia in order to determine those patients best suited for medical therapy, angioplasty/stenting, or surgery. Imaging is also necessary to evaluate left ventricular function because ejection fraction and end systolic volume are important in predicting the long-term prognosis and likely benefit from various therapeutic options. Imaging studies are also required to demonstrate abnormalities such as aortic stenosis and hypertrophic

cardiomyopathy, which can produce angina in the absence of coronary obstructive disease.

The historically established imaging studies that may be used in evaluating suspected chronic myocardial ischemia are chest radiography, radionuclide myocardial perfusion imaging and ventriculography with and without stress; and catheter-based coronary angiography, and left ventriculography. Stress echocardiography (echo) and computed tomography (CT), both electron beam and multidetector CT (MDCT), have made significant progress in the evaluation of ischemic heart disease. Positron emission tomography (PET) is also now available for this purpose. Cardiac magnetic resonance imaging (MRI), while making significant headway in the diagnosis of infarction, is less widely used for stress-induced ischemia. In those patients who do not present with signs classic for angina pectoris, or in those patients who do not respond as expected to standard management, the exclusion of noncardiac causes of chronic chest pain require the use of additional studies, including esophagography, upper gastrointestinal series, and biliary imaging with ultrasound (US).

Chest Radiography

The chest radiograph is an inexpensive test that can rapidly demonstrate many noncardiac causes of chronic chest pain, including a variety of diseases of the mediastinum, pleura, or lung. It may also provide qualitative information about left ventricular function as reflected in cardiac size and pulmonary venous status. However, radiography can neither establish nor exclude chronic ischemic heart disease. It is relatively insensitive for detecting coronary arterial calcification. Also, fluoroscopy cannot reliably detect coronary artery disease (CAD).

Radionuclide Imaging

Stress myocardial perfusion imaging demonstrates relative myocardial perfusion defects, indicating the presence of myocardial ischemia. For this reason, it is considered an important first line study in the evaluation of patients with chronic chest pain. The territory of the perfusion defect identifies the likely culprit coronary artery and can sometimes distinguish between significant single-vessel and multi-vessel coronary arterial obstruction(s). The rest and redistribution perfusion scans demonstrate reversibility (ischemia) or irreversibility (infarction) of the perfusion defect.

Technetium 99m sestamibi has been shown to be more specific for ischemia when compared to thallium. In a meta-analysis of 20 published studies including 488 patients studied with technetium 99m sestamibi, sensitivity and specificity were calculated to be 81% and 66% respectively with positive and negative predictive values of 71% and 77% respectively for detecting hibernating myocardium. Limitations of stress myocardial perfusion imaging are its relatively high cost, difficulties with interpretation (especially in women), and difficulties imaging obese patients.

Stress radionuclide ventriculography (RNV) consists of measurement of the ejection fraction and assessment of regional wall motion at rest and at the peak of stress. This technique can be used to identify patients with "balanced" 3-vessel disease, which can be missed in perfusion studies and for differentiating

attenuation artifacts from infarcts, although CT is becoming increasingly useful for these indications. Wall motion abnormalities and ejection fraction have been shown to be independent predictors of the extent of CAD. However, stress myocardial perfusion scintigraphy is generally the preferred method for identifying regional ischemia, and stress RNV is not usually necessary if an adequate perfusion study has been obtained. In the presence of a positive perfusion study, the stress RNV is superfluous.

In patients with typical angina (high pretest likelihood of disease), stress perfusion or RNV studies are useful for estimating the extent (single-vessel versus multi-vessel disease) and severity of coronary stenosis, which has relevance for prognosis, choice among therapeutic options, and advisability of performing coronary arteriography. In patients with atypical angina, stress perfusion imaging is useful for determining whether myocardial ischemia is the etiology.

Positron Emission Tomography

Myocardial PET imaging with ^{82}Rb , fluorodeoxyglucose (FDG), and ^{13}N is now reimbursable by the Center for Medicaid and Medicare Services, underscoring recent technology advances. The coincidence detection method used in PET imaging allows for reliable correction of the problems associated with nonuniform attenuation of photons in the chest and for differences between men and women. In a meta-analysis of 8 studies with 791 patients evaluated for CAD by PET, a combined sensitivity and specificity were determined to be 93% and 92%, respectively. In the same article, three studies comparing TI-201 single-proton-emission computed tomography (SPECT) and Rb-82 or NH₃ PET were analyzed, and the overall accuracy of PET was 91%, compared to 81% for TI-201 SPECT. It also may be the case that the sensitivity of PET can be increased when it is performed with CT.

Echocardiography

Stress 2-dimensional (2-D) echo is increasingly used for patients with suspected regional wall motion abnormalities produced by regional ischemia, in part because of the ubiquity of 2-D echocardiography. Technical limitations associated with exercise stress can be overcome by using pharmacological (dobutamine) stress. A recent meta-analysis of 44 studies indicated that stress echocardiography has a similar sensitivity to stress SPECT (85% and 87%, respectively) with a higher specificity (77% vs. 64%). This technique is limited by the fact that it sometimes yields nondiagnostic results and that suboptimal definition of some regions of the left ventricle can lead to subjective interpretation. Resting echocardiography can be useful if pericardial effusion or valvular or chamber abnormalities are suspected.

Transesophageal echocardiography is generally not indicated for evaluating chronic angina. The expense of this study does not justify its use in this setting. Although it is sometimes used for assessing aortic pathology (e.g., dissection, aneurysm, and penetrating ulcer) in patients with chronic chest pain, CT and MRI are less invasive and simpler to perform.

Computed Tomography

Electron beam (ultrafast) CT (EBCT) can detect the presence and severity of calcification, a sign of coronary atherosclerosis. EBCT is very sensitive for significant atherosclerotic disease, but many coronary lesions are eccentric and do not decrease the luminal diameter; therefore the presence of calcification is not specific for stenosis. A meta-analysis of 9 studies and 1662 subjects calculated a pooled sensitivity and specificity of 92.3% and 51.2%, respectively, for $\geq 50\%$ stenosis. The absence of coronary arterial calcification (CAC) in patients with chronic angina makes significant coronary obstructive disease unlikely (less than 1%) but does not exclude it. Similarly, the presence of 3-vessel disease and/or extensive calcification (e.g., a high calcium score) confers a high likelihood of coronary obstructive disease, but it does not confirm the diagnosis.

Because of the limitations described above, at present no CT vendor manufactures commercial EBCT units, and support for units currently in use is becoming scarce. Research focused on the relative equivalence of EBCT and MDCT with submillimeter spatial resolution and high temporal resolution has demonstrated agreement between coronary calcium scores, despite early reports of poor correlation with older CT technology.

Calcium scoring (noncontrast ECG-gated MDCT) is controversial. On one hand, the test is relatively inexpensive, and absence of coronary calcification is useful evidence against myocardial ischemia. In a large study of 10,377 subjects it has been shown that coronary calcium score provides independent incremental information in addition to traditional risk factors in the prediction of all cause mortality. On the other hand, patients who present with chronic chest pain of suspected cardiac origin are typically older, with a significant proportion over 60 years old. Because coronary calcium is so prevalent in this population, a "positive" score, even in the upper quartiles, cannot be used as strong evidence of myocardial ischemia.

There is also significantly greater use of coronary CT angiography (CTA) (specifically, contrast enhanced ECG-gated MDCT) to evaluate for CAD. Over the past 5 years, CT vendors have increased the number of detectors (from 4 to 64 and, with experimental human results, up to 256), improved the spatial resolution to submillimeter, and decreased the temporal resolution to approximately 0.1 second. While these improvements have not equaled catheter-based coronary angiography, recent studies have shown a high sensitivity of MDCT for treatable stenoses of the coronary arteries. Using present technology, the major strength of coronary CTA is its high negative predictive value (in comparison with the positive predictive value), and thus it suffers the same limitations as calcium scoring. It should be noted that the utility of coronary CTA becomes limited in more elderly patients (i.e., those with a high burden of calcium) who have a pretest probability of CAD. Namely, the population of patients who present with chronic chest pain typically have CAD, and thus excluding a hemodynamically significant stenosis may be challenging. In patients who are younger and who have a lower pretest probability of CAD, coronary CTA can exclude a coronary etiology of chronic chest pain. Moreover, CT can exclude 3-vessel disease potentially missed by nuclear imaging (e.g., so-called "balanced" ischemia) in patients with a high clinical suspicion of CAD.

There are other indications for which CT is the imaging test of choice, specifically aortic disease (aortic dissection, penetrating aortic ulcer, etc) and pulmonary

embolism. CT has the advantage that it detects, with high specificity, a large number of extracardiac diagnoses.

Magnetic Resonance Imaging

Use of MRI for evaluating cardiac anatomy, valvular disease, certain cardiomyopathies, viability, and cardiac function continues to evolve. Protocols for measuring myocardial perfusion and angiography of the pulmonary and systemic vessels have matured significantly in the past few years. Magnetic resonance angiography (MRA) of the coronary arteries is still problematic due to their small size and incessant motion tied to the respiratory and cardiac cycles. At this time, MRA should be limited to sites with extensive experience and appropriate hardware and software to exclude disease in the proximal coronary arteries. At present, only CTA can noninvasively visualize coronary arteries on a routine basis.

MRI myocardial perfusion can be used to assess for significant CAD. First pass perfusion, rest perfusion, and stress perfusion protocols have been developed and validated; these are equivalent to and in some cases reported superior to SPECT. High-dose dobutamine stress cardiac MRI has also been used in patients with poor acoustic windows which would have otherwise limited the utility of stress echocardiography and has been shown to have a higher diagnostic accuracy than dobutamine stress echocardiography. However, MRI is difficult to use, as most patients with pacemakers or implanted cardiac defibrillators are prohibited from obtaining a study and some other patients are too claustrophobic to tolerate an examination that routinely requires up to 60 minutes. While MRI is significantly more expensive than other studies that provide similar information, it can be used as a problem-solving tool for patients who can benefit from the high image contrast inherent in the myocardium and blood interface.

Invasive Techniques

Catheter-based angiography remains the coronary imaging modality with the highest spatial and temporal resolution. Thus, despite the fact that only projection images are obtained (as opposed to 3D volumes in CT), catheter-based angiography is considered by most to be the "gold-standard" for depicting the anatomy and the severity of obstructive CAD and other coronary arterial abnormalities (such as spasm). Moreover, it is needed to guide transluminal interventions. There is no general agreement regarding its use in patients with angina, but it is clearly not indicated in all patients who present with chronic chest pain. There is evidence that this test may be over utilized.

There remains agreement that catheter-based angiography is indicated in patients in whom angina is not adequately managed by vigorous medical therapy and in those in whom left main stenosis or severe multivessel disease is suggested by results of nuclear perfusion imaging. Left ventricular catheterization and left ventriculography are generally indicated, but not always necessary, to define ventricular function in patients with angina. In many patients, left ventricular function can be evaluated adequately using noninvasive studies (echocardiography and RNV).

Other Studies

Neither ultrasound nor nuclear imaging of the biliary system is usually indicated in patients who present with typical angina. However, patients who fall under the category of "chronic chest pain" can have a variety of diagnoses, and intermittent biliary obstruction from a gallstone can mimic intermittent pain from CAD. With respect to the "chronic" patient, a similar argument can be made for gastroesophageal reflux, and a fluoroscopy-based esophagram with or without an upper GI study, or endoscopic evaluation of the esophagus, can be obtained when symptoms are not classic for pain of a cardiac origin, or when the patient does not respond to standard therapy.

Summary

The defined approach to evaluation of the patient with chronic chest pain of probable cardiac origin is supported by a substantial body of literature. For patient with 1) a classic history and physical examination and 2) expected response to medical therapy, no imaging study may be needed. Otherwise, stress nuclear imaging is used as a front-line modality to establish the diagnosis and assess the severity of myocardial ischemia. Based on the results of nuclear perfusion and/or clinical response to medical therapy, the next procedure is usually coronary angiography with or without cardiac catheterization and/or left ventriculography. Given the underlying prevalence of coronary artery disease (CAD) in this patient population, the substitution of newer examinations (e.g., computed tomography [CT] and stress echocardiography) is promising but at present is not justified by current data; this outlook could change based on results of comparative studies and comparative cost analysis.

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with chronic chest pain of suspected cardiac origin

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Gerson DS, Rybicki FJ, Yucel EK, Khan A, Haramati LB, Ho VB, Rozenshtein A, Schoepf UJ, Stanford W, Woodard PK, Jaff M, Expert Panel on Cardiac Imaging. Chronic chest pain-suspected cardiac origin. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 6 p. [39 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2006)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Cardiac Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: David S. Gerson, MD; Frank J. Rybicki, MD, PhD; E. Kent Yucel, MD; Arfa Khan, MD; Linda B. Haramati, MD; Vincent B. Ho, MD; Anna Rozenshtein, MD; U. Joseph Schoepf, MD; William Stanford, MD; Pamela K. Woodard, MD; Michael Jaff, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Higgins CB, Bettmann MA, Boxt LM, Gomes AS, Grollman J, Henkin RE, Kelley MJ, Needleman L, Pagan-Marin H, Polak JF, Stanford W. Chronic chest pain--suspected cardiac origin. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):29-34.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

ACR Appropriateness Criteria® *Anytime, Anywhere*™ (PDA application). Available from the [ACR Web site](#).

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on February 20, 2001. The information was verified by the guideline developer on March 14, 2001. This NGC summary was updated by ECRI Institute on April 26, 2007.

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